

# AUXILIARY DRIVE WHEEL VEHICLE PARKING MECHANISM (FIFTH WHEEL CAR PARKING MECHANISM)

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## Abstract

In earlier methods of parking, the driver would taken to be more time as well as alert while parking in compact spaces avoid hitting of the vehicle during the movement of vehicle. The parking is a big problem in the big cities due to congestion of roads and traffic regulation and if it is a unskilled driver it will be a big problem to the other drivers also maximum time is needed for parking. Therefore to avoid these inconveniences, a concept of parking is developed for taking least time for parking and

aim of this system is to fold the auxiliary wheel for better space adaptability also placed in boot space. This parking can be done using an additional wheel (an Auxiliary Drive Wheel) most probably this will be a Stepney wheel. Initially, when the driver finds a slot for parking, he pushes the button and the DC motor actuate the movement of rack and pinion. Rack and pinion will applied force on the one side of triangular hub and due to the pivot point the triangular hub move in angular moment and other side of triangle will lift auxiliary wheel. This will land the auxiliary wheel on the road and slightly lifts the rear side of the vehicle. A rack and pinion and triangular hub set up is used to control an Auxiliary drive wheel to land and lift. The model enables the driver to park the vehicle between two vehicles, where the space is limited.

**Keywords:**Auxiliary Drive Wheel, DC Motor, Triangular hub, Rack and Pinion, Stepney wheel.

## 1 INTRODUCTION

Roads that facilitate parallel parking have an additional lane or an outsized shoulder for put cars. it's also used whenever parking facilities aren't accessible typically in giant metropolitan areas wherever there's a high density of vehicles and few (or restricted) accommodations like multi- keep automobile parks. Some jurisdictions have eliminated individual spots permitting shorter vehicles to use less area. Parallel parking could be a methodology of parking a vehicle in-line with different put vehicles. Parallel parking needs at first driving slightly past the automobile parking space, parallel to the put vehicle before of that area, keeping a secure distance, and so followed by reversing into that area. later position adjustment could need the utilization of forward and reverse gears. Parallel parking is taken into account to be one in every of the toughest skills for brand new drivers to be told. Parallel parking enables the driver to park a vehicle in a smaller space than would be true of forward parking. Driving forward into a parking space on the side of a road is typically not possible unless two successive parking spaces are empty. Reversing into the spot via the parallel parking technique allows one to take

advantage of a single empty space not much longer than the car. New drivers learn to use reference points to align themselves in relation to the car in front of the space, to determine the proper angle for backing, and to determine when to turn the steering wheel while backing. They may find it easier to briefly stop at each reference point and turn for the next step. Two major types of parallel parking technique differ in whether they will use two or three positions of the steering wheel while backing. A skilled driver may be able to parallel park successfully by backing with the steering wheel turned all the way to the left and then immediately cranking the wheel all the way to the right at a critical point. For beginning drivers, those with larger cars or bad sight lines, this may risk collision with either the car in front of or behind the parking space, or it could also result in the car being parked too far away from the curb. Such drivers may find it easier to include an intermediate step, where after having achieved the ideal angle for backing up they back up with the wheels straight until the rear end of the car is far enough back to allow them to make their final reverse turn. While steering wheel positions in between full-right, straight, and full-left are possible to use, beginners may be able to gauge their progress more effectively by turning the wheel all the way to the right or left.

## 2 LITERATURE REVIEW

In 1950s, The Walker had developed a parallel wheel parking system for automobiles and trucks and he developed in his conception in an exceedingly Saab sedan car conjointly developed his self -parking conception in ford beach waggon. conjointly in 1970s of these ideas of automobiles modifying by that tire may be fitted underneath chassis and hidden underneath the car, motivated once the method begin for parking in slots. every of this method got to set at very cheap of every automobile. This mechanism was fitted underneath the chassis that with facilitate of rack and pinion or with the assistance of centrally fitted worm and gear wheel. The Packard Cavalier developed the conception that is totally different from Walkers parking conception. The Packard used the additional tire for the parking and this

originated was used move the automobile in circular arrangement. this idea applied to the automobile with none changes within the entities or in structure of automobile.

**Janhvi Nimble et.al.** had developed bound ideas for parking in huge cities or busy cities, notably facing the traffic problems, was tough within the car park. Parking drawback had huge issue to face traffic network and in life quality. completely different ideas were developed for progress in automatic or simple parking for vehicles. final aim of her analysis was to develop glorious, user friendly automatic automotive parking that reduces personnel, traffic congestions and secure parking slots in restricted space. the standard parking systems were like structure, automaton automotive parking systems, automatic structure automotive parking systems etc. had been used on an oversized scale. however these systems have a serious disadvantage of enormous area consumption that is with success eliminated with the assistance of parallel automotive parking mechanism. varied ways were used for development of autonomous and intelligent parking systems. Study of those systems needs a trifle or a lot of human interference for the functioning. sensible Parking system planned a mechanical model which incorporates image process facility. With the assistance of carry cars were put at multiple levels. To captured the amount plate and hold on in info for comparison to avoid unofficial automotive entry image process was used. the most benefits of this systems were area optimization, value effectiveness and security.[1]

**D. Gorinevsky et.al.** had performed the implementation of a parking control system to support an automatic parking system mode in activate in cars. By using development in the parking concept technique without using the manpower for controlling the parking of cars. They invented controller for controlling of parking. They came to conclusion of the calculation and designing, containing parking problem analysis, problem. Two general cases of backward parking considered in this work are emulated using the proposed controller. The controller design gave high efficiency and proves that the prototype system can be invented for a typical passenger car. They had proven that automatic parking well as simply solving the parking problem with the help of controller, but with huge complex cases of car

parking as well. The car parking problem results proved that and gets exact confirmation of solution to the automatic parking control problem. Automatic parking can be invented for the solving parking problem.[2]

**Sawankumar G. Narone et.al.** had focused on car manufacturing related with the ease of Car Parking System. This system had developed to reduce the use of large land space for the parking which was creating problem in big busy cities. Various types of parking systems are gathering all over the world namely automatic car parking, rotary car parking, autonomous car parking, parallel parking, fifth wheel parking. The present problem of parking is target to invent automatic prototype model which can solve the original issue face by big cars for parking in parking area. The chain, sprocket, rack and pinion, worm and worm gear mechanism is get link and form mechanism. This whole prototype model is work and rotates by a D.C motor or stepper motor. When the car street or road or parking slots the car is ready for the parking and the vehicle become park. When the button will pressed by the operator, sprocket starts the rotating and the vehicle become park taken less space as well, so they were using this concept to build the technology of automatic parking to where it is needed.[3]

**Amin Kianpishah et.al.** had explained about increased used of cars with increasing population and its adverse effects on surroundings of vehicle mass production, but large space for the parking places and lands are required. Hence they had developed the concept for vehicle parking system defines as the smart parking system (SPS) is invented for taken as less time and less space as well. The new concept had been developed by using the ultrasonic sensors to identifying the either space for car parking or to less space for park. Various concepts have been developed but as compared to other techniques smart parking is the best technology. The smart parking was containing the various process space detection, parking space, image processing, viewing of less space for parking, indicating the correct direction, and payment facilities and different types of parking spaces through the use of specific controlling unit. They had been described automatic parking system from car enter in parallel parking slots the controller detecting the vacant spaces on road side or street. The

system containing the image processing to display the car motion to park in slots with help of sensors or LED.[4]

**Mayur S. Raipure et.al.** had described about development in the parking system through the automobile industry ,particularly in the four wheelers. Also they were explained the main purpose to wheel move in circular motion (90 degree). Four wheeler or any vehicle can be park in any direction with getting from planned and regulated movement as compared to the other larger vehicles. The ability to move along any direction irrespective of the orientation of the vehicle makes it an attractive option in dynamic environment. They used some system for certain movements in which can be seen in car. Here they had described on the prototype model which can easily movement in all directions on the street. They had discussed about motion and movement about the car system which implement in actual vehicle. They said that the advancement in the parking problem is very important .The improvement in the automobile industry especially in the four wheeler is tough challenge for us.[5]

**Apurva Medhekar et.al.** had recent search on major problem facing against the car parking in congested or small spaces. Large scale infrastructure companies like Whor, Tal manufacturing ltd, Claus, Pari parking solutions, Dae Duck engineering, etc. developing concept for the parking implemented in the car. The car can be rotated in 3600 with safety of car. This system was much efficient for parking in circular or lateral direction in the less space utilization or other energy available sources. This system concept has contained the conveyor belt, controller system, solar panels. With all the combination of parking types are the unique one from all other parking system which invented for the ease of parking, less spacing required, with minimum cost and manipulate. As compared to other parking system multilevel circular parking system becoming efficient than other for less consuming space as well as safety.[6]

### 3 MECHANISM

This mechanism is utilizing rack and pinion system, triangular pivot and chain drive for exploit. The rack and pinion mechanism

can initiate the method of motion transfer and transfer it to triangular pivot and it leads to movement of fifth wheel with the assistance of chain and sprockets in conjunction with electrical motor if required. This invention relates typically to vehicles. a lot of significantly, the current invention issues with maneuverability of vehicles in restricted areas. a automatically retractile assembly for article of furniture in vehicles that, once motivated, causes associate auxiliary wheel to exerting a rubbing force and park in restricted areas like parking slots. Aim for development of a system to show the vehicle base frame at zero to 360angle. DC motor used for driving Vehicle model. Chain and sprocket or DC motor arrangement can transfer the ability from motor to vehicle axel. At the rear side we are going to provide auxiliary drive wheel on perpendicular plane of four wheels. Triangular pivot principal (as shown in the fig.2) used for folding of an auxiliary drive wheel. As shown in fig.2 rack and pinion will applied force on the one side of triangular hub. Due to the pivot point on the top of the triangle, other side of triangle will lift the fifth wheel. For the actuation of rack DC motor will provided at the pinion. Hence whenever needed operated must have unfold the fifth wheel axel by liner actuator (Rack and Pinion). In the normal drive the vehicle will travel with the normal four wheels whereas during the parallel parking the fifth wheel comes to action and the remaining two rear wheels will be not in contact with the ground.

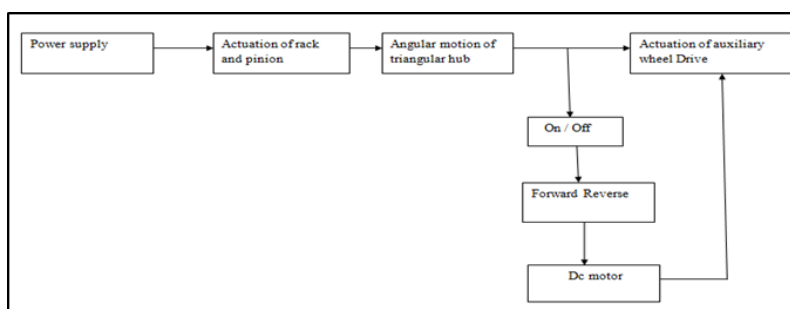


Figure 1: Flow of the System

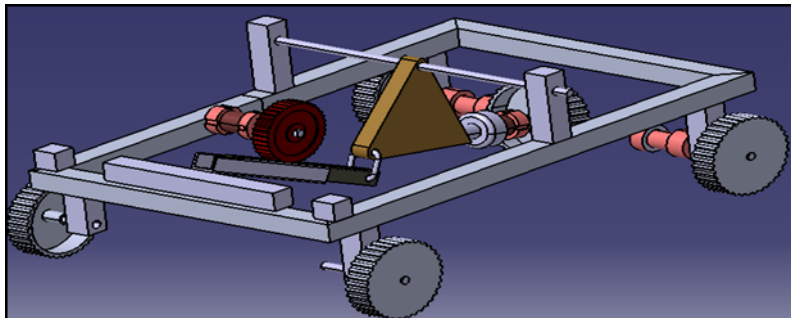


Figure 2: 3D view of the system

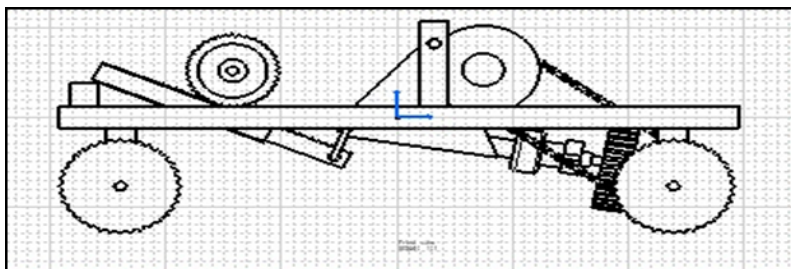


Figure 3: 2D view of the system



## 4 ANALYTICAL RESULT

The purpose of the FEA is to check the design for failure before manufacturing stage. This helps to eliminate the defects in the design and reduced the cost and also helpful aesthetically and ergonomically. Design engineers always go with this analysis and also easy for representation.

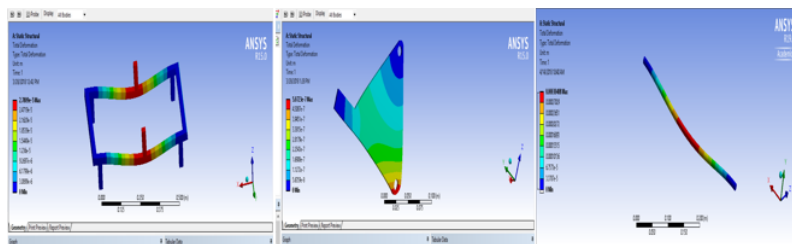


Figure 4: Total Deformation of Chassis, Shaft Triangular pivot

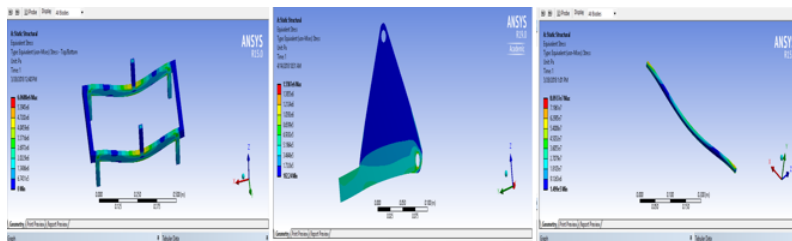


Figure 5: Von- Mises stress of Chassis, Shaft Triangular pivot

## 5 ADVANTAGES

- To obtain better parking in narrow space and at multiplexes.
- To obtain 0 to 360 degree turning with zero turning radius.
- Resolve Traffic Problems.
- Vehicle parking and driving in city conditions with heavy traffic in tight spaces.

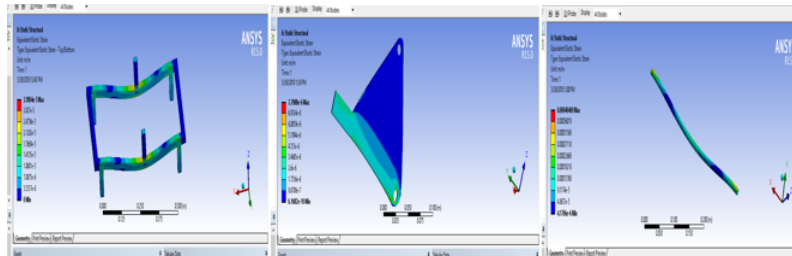


Figure 6: Equivalent strain analysis of Chassis, Shaft Triangular pivot

- This type of car can be taken through traffic jam.
- Saving of Time.

## 6 FUTURE SCOPE

- Aim for development of a system to useful in the automotive sector.
- Four bar mechanism will be implementing for working of fifth wheel, our aim is to fold the fifth wheel axel for better space adaptability.
- Hence whenever needed operated must have unfold the fifth wheel axel by actuating rack and pinion.
- Arrange conventional steering system at front side.

## 7 CONCLUSION

A vehicle featuring low cost and user friendly steering mechanism for Auxiliary wheel has been introduced. This paper focused on a steering mechanism which offers feasible solutions to a number of current maneuvering limitations. A prototype for the proposed approach was developed by introducing separate mechanism for normal steering purpose and 360 degree steering purpose. This prototype was found

to be able to be maneuvered very easily in tight spaces, also making 360° steering possible.

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